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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,436	11/24/2003	Michel Betancourt	RSW920030266US1	6081

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EXAMINER

KROFCHECK, MICHAEL C

ART UNIT PAPER NUMBER

2186

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/720,436	<b>Applicant(s)</b> BETANCOURT ET AL.	
	<b>Examiner</b> Michael Krofcheck	<b>Art Unit</b> 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 12/22/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. This office action is in response to application 10/720,436 filed on 11/24/2003.
2. Claims 1-28 have been submitted for examination.
3. Claims 1-28 have been examined.

#### ***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 19-26 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.
6. Claims 19-26 are not limited to tangible embodiments. In view of the applicant's disclosure, specification page 23, lines 10-16, the medium is not limited to tangible embodiments, instead being defined as including both tangible embodiments (e.g., floppy disks, RAM) and intangible embodiments (e.g., radio frequency and light wave transmissions). As such, the claim is not limited to statutory subject matter and is therefore non-statutory. Amending the specification by removing, "using transmission forms, such as, for example, radio frequency and light wave transmissions" would satisfy the requirements.

#### ***Claim Rejections - 35 USC § 103***

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7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-2, 5-9, 11, 13-14, 17-20, 23-24, 26-28 rejected under 35 U.S.C. 103(a) as being unpatentable over Arnold et al., U.S. Patent Application Publication 2002/0107879 (hereinafter Arnold) and Kolodner et al., U.S. Patent 6,289,360 (hereinafter Kolodner).

11. With respect to claim 1, Arnold teaches of a method in a data processing system for collecting data for analyzing memory leaks, the method comprising: associating a plurality of indicators with a plurality of objects (paragraph 0048-0050),

setting an indicator for each live object in the plurality of objects to a second state (fig. 5; paragraph 0049 and 0050; where the trace stage marks the reachable (live) objects); and

responsive to a request for the data, collecting data from all objects in the plurality of objects having indicators set to the first state (figs. 5, 6; paragraph 0050-0053; where the unreachable or unmarked object's trace record data is stored. This continues until all collectable objects trace record data is stored).

Arnold fails to explicitly teach of wherein the plurality of indicators are set to a first state. However, Kolodner teaches of associating a plurality of indicators with a plurality of objects, wherein the plurality of indicators are set to a first state (column 3, lines 10-25; where the colors (indicators) are associated with each object; and each object is initially unmarked or white (first state)), and

Arnold and Kolodner are analogous arts as they are both in the same field of endeavor, garbage collection. It would have been obvious to one of ordinary skill in the art having the teachings of Arnold and Kolodner at the time of the invention to incorporate having all objects initially being unmarked/white in marking scheme of the garbage collection taught in Kolodner into the garbage collection of Arnold as it is a common conventional method (Kolodner column 3, lines 8-10).

12. With respect to claim 9, Arnold teaches of a method in a data processing system for collecting data used to detect memory leaks in a Java virtual machine, the method comprising: associating an indicator with an object in a heap (fig. 4, item 46; paragraph 0036; paragraph 0048-0050);

responsive to a first request, setting indicators for all live objects in the heap from the default state to a live state (fig. 5; paragraph 0049-0050; where the trace stage marks the reachable (live) objects); and

responsive to a second request, collecting information for all objects having indicators in the default state, wherein objects having indicators in the default state are objects with memory leaks (figs. 5, 6; paragraph 0050-0053; where the unreachable object's trace record data is stored. This continues until all collectable objects trace record data is stored. As the objects that are useable are all marked, therefore the unmarked ones are not useable and thus the product of "memory leaks").

Arnold fails to explicitly teach of wherein the indicator is set to a default state. However, Kolodner teaches of associating an indicator with an object in a heap, wherein the indicator is set to a default state (column 3, lines 10-25; where the colors (indicators) are associated with each object; and each object is initially unmarked or white (default state));

13. With respect to claim 13, Arnold teaches of a data processing system in a data processing system for collecting data for analyzing memory leaks, the data processing system comprising: associating means for associating a plurality of indicators with a

plurality of objects (paragraph 0048-0050; the mark-scan garbage collector marks or unmarks objects);

setting means for setting an indicator for each live object in the plurality of objects to a second state (fig. 5; paragraph 0049 and 0050; where the trace stage of the garbage collector marks the reachable (live) objects); and

collecting means, responsive to a request for the data, for collecting data from all objects in the plurality of objects having indicators set to the first state (figs. 5, 6; paragraph 0050-0053; where the unreachable or unmarked object's trace record data is stored in the trace record. This continues until all collectable objects trace record data is stored).

Arnold fails to explicitly teach of wherein the plurality of indicators are set to a first state. However, Kolodner teaches of wherein the plurality of indicators are set to a first state (column 3, lines 10-25; where the colors (indicators) are associated with each object; and each object is initially unmarked or white (first state)).

14. With respect to claim 18, Arnold teaches of a data processing system in a data processing system for collecting data used to detect memory leaks in a Java virtual machine, the data processing system comprising: associating means for associating an indicator with an object in a heap (fig. 4, item 46; paragraph 0036; paragraph 0048-0050; the mark-scan garbage collector marks or unmarks objects in the heap);

setting means, responsive to a first request, for setting indicators for all live objects in the heap from the default state to a live state (fig. 5; paragraph 0049-0050; where the trace stage of the garbage collector marks the reachable (live) objects); and

collecting means, responsive to a second request, for collecting information for all objects having indicators in the default state, wherein objects having indicators in the default state are objects with memory leaks (figs. 5, 6; paragraph 0050-0053; where the unreachable object's trace record data is stored. This continues until all collectable objects trace record data is stored in the trace record. As the objects that are useable are all marked, therefore the unmarked ones are not useable and thus the product of "memory leaks").

Arnold fails to explicitly teach of wherein the indicator is set to a default state. However, Kolodner teaches of wherein the indicator is set to a default state (column 3, lines 10-25; where the colors (indicators) are associated with each object; and each object is initially unmarked or white (default state));

15. With respect to claims 19 and 24, Arnold and Kolodner teach of the limitations cited above with respect to independent claims 1 and 9. Additionally it is abundantly clear to one of ordinary skill in the art that there are instructions that carryout the above mentioned actions.

16. With respect to claim 27 and 28, Arnold and Kolodner teach of the limitations cited above with respect to independent claims 1 and 9. Arnold teaches of a bus system (fig. 4; where the processor is connected to a memory and mass storage by the busses shown in fig. 4.);

a memory connected to the bus system, wherein the memory includes a set of instructions (fig. 4; paragraph 0036-0038; where the memory is connected to the



processor by the bus system. The memory contains a JVM and a program thread and collector thread (instructions)); and

a processing unit connected to the bus system, wherein the processing unit executes a set of instructions (fig. 4; paragraph 0035-0038; where the processor is connected to a memory and mass storage by the busses. The processor executes the program threads of the JVM including the collector thread which contains the garbage collector).

17. With respect to claims 2, 14, and 20, the combination of Arnold and Kolodner teach of all the limitations of the parent claims as discussed supra. Arnold teaches of initiating a garbage collection process to free unused objects prior to the collecting step (fig. 5; paragraph 00; where the JVM executes the garbage collector which creates the trace data that is then written into the trace record (collection step)).

18. With respect to claims 5, 17, 23 the combination of Arnold and Kolodner teach of all the limitations of the parent claims as discussed supra. Arnold teaches of wherein the method is implemented in a Java virtual machine (fig. 4; paragraph 0036-0038; where a JVM execution module is configured program threads including a collector thread that is used to deallocate unused data stored in an object heap).

19. With respect to claim 6, the combination of Arnold and Kolodner teach of all the limitations of the parent claims as discussed supra. Arnold teaches of wherein the data is placed into a text file (fig. 6; paragraph 0052-0053; where the trace record data is stored in the trace record. It is abundantly clear to one of ordinary skill in the art that the trace record table is stored as a file of text).

20. With respect to claim 7, the combination of Arnold and Kolodner teach of all the limitations of the parent claims as discussed supra. Arnold teaches of wherein the plurality of objects are located in a heap (fig. 4; paragraph 0036-0037, 0048).

21. With respect to claims 8, 11, 26 the combination of Arnold and Kolodner teach of all the limitations of the parent claims as discussed supra. Arnold teaches of wherein the requests are received from a Java application (fig. 4; paragraph 0036-0038; as the garbage collection and recording into the trace record are carried out within a JVM, the requests to initiate such must have originated from a JAVA application).

22. Claims 3-4, and 12, and 15-16, and 21-22 rejected under 35 U.S.C. 103(a) as being unpatentable over Arnold and Kolodner as applied to claims 1, 9, 13, 19 respectively, and further in view of Czajkowski, U.S. Patent 6,594,749.

23. With respect to claims 3, 15, and 21 the combination of Arnold and Kolodner teach of all the limitations of the parent claims as discussed supra. The combination of Arnold and Kolodner fails to explicitly teach of wherein each of the plurality of indicators is a bit associated with a corresponding object in the plurality of objects. However, Czajkowski teaches of wherein each of the plurality of indicators is a bit associated with a corresponding object in the plurality of objects (fig. 2a; column 6, lines 23-30; where each memory block in the heap is associated with a status bit).

The combination of Arnold and Kolodner, and Czajkowski are analogous arts as they are both in the same field of endeavor, garbage collection. It would have been obvious to one of ordinary skill in the art having the teachings of Arnold, Kolodner, and Czajkowski at the time of the invention to implement the status bits taught in Czajkowski

to identify the marked and unmarked statuses in the combination of Arnold and Kolodner. Their motivation would have been to reduce the complexity and overhead (column 3, lines 5-9).

24. With respect to claims 4, 16, 22 the combination of Arnold, Kolodner, and Czajkowski teaches of all the limitations of the parent claims as discussed supra. The combination of Arnold and Kolodner fails to explicitly teach of wherein the first state is a logic zero and the second state is a logic one. However, Czajkowski teaches of wherein the first state is a logic zero and the second state is a logic one (figs. 2; column 7, lines 3-13; As the status bit can only be a logic 1 or a logic 0, it is abundantly clear to one of ordinary skill in the art that the selection of which state corresponds to which logical indication (1 or 0) is purely arbitrary).

25. With respect to claim 12, the combination of Arnold and Kolodner teaches of all the limitations of the parent claims as discussed supra. The combination of Arnold and Kolodner fails to explicitly teach of wherein the first state is a logic zero and the second state is a logic one. However, Czajkowski teaches of wherein the first state is a logic zero and the second state is a logic one (figs. 2; column 7, lines 3-13; As the status bit can only be a logic 1 or a logic 0, it is abundantly clear to one of ordinary skill in the art that the selection of which state corresponds to which logical indication (1 or 0) is purely arbitrary).

26. Claims 10 and 25 rejected under 35 U.S.C. 103(a) as being unpatentable over Arnold and Kolodner as applied to claims 9 and 24 respectively, and further in view of Adl-Tabatabai et al., U.S. Patent 6,317,869 (hereinafter Adl-Tabatabai).

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27. With respect to claims 10 and 25, the combination of Arnold and Kolodner teaches of all the limitations of the parent claims as discussed supra. The combination of Arnold and Kolodner fails to explicitly teach of wherein the indicator is associated with the object when the object is created. However, Adl-Tabatabai teaches of an indicator is associated with the object when the object is created (fig. 4b, 5a; column 6, line 15-38; where the bit vector is created at compile time and if the variable (object) stores a reference value, then it is assigned a unique bit in the bit vector).

The combination of Arnold and Kolodner, and Adl-Tabatabai are analogous arts as they are both in the same field of endeavor, memory management. It would have been obvious to one of ordinary skill in the art having the teachings of Arnold, Kolodner, and Adl-Tabatabai at the time of the invention to create and associate bits in a bit vector to the memory objects at compile time as taught in Adl-Tabatabai in the combination of Arnold and Kolodner. Their motivation would have been to speed up the execution process.

### ***Conclusion***

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Krofcheck whose telephone number is 571-272-8193. The examiner can normally be reached on Monday - Friday.


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30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

31. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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